Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the	)	PR Docket No. 93-61
Commission's Rules to Adopt	)	
Regulations for Automatic	)	
Vehicle Monitoring Systems	)	

ERRATA TO REPLY COMMENTS

Pinpoint Communications, Inc. ("Pinpoint"), by its attorneys, hereby submits the following errata to its Reply Comments filed in the above-captioned matter on July 29, 1993. A copy of the Reply Comments with those corrections made is attached hereto.

REPLY COMMENTS

1. Page 5, footnote 6: the following text should be added to the end of the footnote: "functionalities in mind is its suggestion that LMS include monitoring the status of fixed units, such as the inventory of vending machines. Comments of Southwestern Bell Mobile Systems, PR Docket No. 93-61 at 5-6 (filed June 29, 1993) ("SBMS Comments")."

2. Page 7, footnote 10: the reference should be to "Section IV" not "Section II".

3. Page 9, third line of the text: quotation marks should be inserted after "time slices,".

4. Page 11, footnote 26: the location of footnote 26 should be moved from its current location so that it follows the phrase "down the road," on the third line from the bottom of the text.

5. Page 19, first full paragraph, third line: replace "notion of competition. Given" with "notion of competition, given".

6. Page 24, footnote 54: the reference should be to "pp. 2-3" not to "p. 3."

7. Page 26, last line of the carry-over paragraph: quotation marks should be placed at the end of the paragraph before the footnote (60) reference.

8. Page 30, last line of the carry-over paragraph: there should be a period at the end of the line.

9. Page 47, footnote 116, third line: "result in markedly" should be replaced with "result in a markedly".

10. Page 47, footnote 117, third line: "local-area where" should be replaced with "local-area system where".

11. Page 51, footnote 129: the footnote should read "Pickholtz at 6."

12. Page 54, footnote 137: the footnote should read as follows: 'Comments of Pinpoint Communications, Inc., ET Docket No. 93-59 at 5 (filed June 15, 1993) ("Pinpoint Wind Profiler Comments"); Reply Comments of Mark IV, ET Docket No. 93-59 at 1-2 (filed July 15, 1993); Reply Comments of North American Teletrac and Location Technologies, ET Docket No. 93-59 at 2-3 (filed July 15, 1993) ("PacTel Wind Profiler Reply Comments"); Reply Comments of Hughes Aircraft Company, ET Docket No. 93-59 at 4-5 (filed July 15, 1993).'

13. Page 55, footnote 138: "Pactel Wind Profiler Comments" should read "PacTel Wind Profiler Reply Comments". In addition, "(June 15, 1993)" should read "(Nov. 2, 1992)".

14. Page 55, footnote 140: "not a foregone in" should read "not a foregone conclusion in".

15. Page 56, footnote 143: the footnote should read "Comments of National Oceanic Atmospheric Admin., ET Docket No. 93-59 at 7-8 (filed June 15, 1993)."

16. Page 57, footnote 144: the footnote should read "*Id.* at 6."

17. Page 58, first full paragraph, seventh line: "way genuine competition" should read "way for genuine competition".

18. Page 58, first paragraph, tenth line: the word "can" should be "cannot".

19. Cover page and page 1: In the caption, under "In the Matter of," the word "Adapt" should read "Adopt".

20. The Table of Contents is corrected to include the Introduction, the sub-sections under Section I, and Sections V, VI, and VII.

TECHNICAL APPENDIX (Appendix B)

1. Page 1, first paragraph, last sentence: "wide-area AVM systems" should read "wide-area AVM system".

2. Page 4, last line of the text: the word "throughout" should read "throughput".

3. Page 6, first full paragraph, last sentence: "Using all the system's capacity of traffic monitoring" should read "Using all the system's capacity for traffic monitoring".

4. Page 10, second full paragraph: "Pinpoint achieves a" should read "Pinpoint achieves".

5. Page 11: the second full paragraph should be deleted. (The deleted text is duplicated in footnote 8.)

6. Page 12, first full paragraph, last sentence: a reference to "Figure 1" should be a reference to "Table 5".

7. Page 14, first paragraph, first sentence: the word "while" should be deleted.

8. Page 14, second paragraph, second sentence: "an average less than once per few minutes" should read "usually less than once per few minutes to less than once per few hours".

9. Page 27, last line of the text: the word "along" should be "alone".

10. Page 31, fourth line: "(other than" should read "other than".

11. Page 32, footnote 18: "As discussed later," should read "As discussed above,".

12. Page 34, last line of the text: "902-924 MHz" should read "902-928 MHz".

13. Page 34, footnote 20: "901-902, 930-931, and 940-941" should read "901-902, 930-931, and 940-941 MHz".

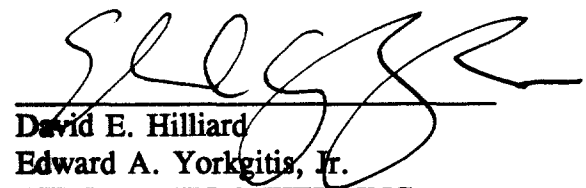
14. Tables following text of the TECHNICAL APPENDIX: Table 4.1 is relabeled Table 1; Table 4.2 is relabeled Table 2; Table 1 is relabeled Table 3; Table 2 is relabeled Table 4; Table 3 is relabeled Table 5. The references in the text of the TECHNICAL APPENDIX to the tables are correct as they have been relabeled.

APPENDIX C

1. Page 9, first full paragraph, second sentence: the word "credibility" should read "credibly".

Respectfully submitted,

PINPOINT COMMUNICATIONS, INC.



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August 3, 1993

ORIGINAL

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July 29, 1993
(Corrected August 3, 1993)

SUMMARY

Pinpoint Communications, Inc. ("Pinpoint") respectfully reasserts its central argument in its initial comments on the Commission's Notice of Proposed Rulemaking ("NPRM") to adopt permanent rules for Location and Monitoring Service ("LMS" formerly termed Automatic Vehicle Monitoring or "AVM"): spectrum sharing by pulse-ranging wide area licensees is both possible and in the public interest.

Notwithstanding the fact that the Commission essentially agrees with this point, and despite its own statements in another proceeding advocating the public interest benefits of open entry licensing, PacTel has opposed sharing in favor of a grant of exclusivity for itself. As the record reflects, however, a grant of exclusivity, even on a temporary basis, would disserve the public interest by precluding future spectrum sharing for AVM/LMS. Competition, technological innovation, expanded consumer choice, and the realization of important national transportation policies would be precluded. Moreover, the exclusivity proposal would run afoul of the venerable *Ashbacker* doctrine by depriving competing AVM interests of their "hearing" and due process rights, as well as abrogating fundamental principles of fairness and the public interest imperative that govern the licensing process.

As the record reveals, the Commission should open the entire 902-928 MHz band to both wide-area and local-area systems on a shared basis because such sharing is in the public interest. Such sharing is also feasible because:

- the throughput capacity of wide-area systems is exponentially related to bandwidth; and
- as acknowledged by sharing detractors, various measures applied through mutual cooperation and effort, can counter interference,

making sharing among wide-area and local-area AVM systems feasible.

This sharing plan, however, need not alter the regulatory status of amateurs and Part 15 unlicensed devices. Given the technical and operational characteristics of these devices, as well as wide-area systems, continued sharing of the band is wholly reasonable.

Finally, the Commission should reject the request of Radian Corporation to contemplate its request for a non-government wind profiler allocation at 915 MHz simultaneous with its execution of new AVM/LMS rules. Because the need for these wind profilers, as well as their interference potential to existing users of the 902-928 MHz band is unknown, the Commission should delay its consideration of this proposal.

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REPLY COMMENTS OF PINPOINT COMMUNICATIONS, INC.

Pinpoint Communications, Inc. ("Pinpoint"), by its attorneys, hereby submits its reply comments in the above-captioned proceeding.

INTRODUCTION

In its opening comments in response to the *NPRM*, Pinpoint, alone among the commenters that have developed wide-area automatic vehicle monitoring ("AVM") technologies, engaged the central issue put forth by the Commission in the Notice of Proposed Rulemaking for wide-area systems: *whether* sharing through "cooperation among co-channel [pulse-ranging wide-area] licensees serving the same area" is possible.[1] Other wide-area system licensees, having the potential for retroactive exclusive licensing that would exempt them from the need to subject their products to a competitive marketplace, chose to take it as a given that sharing was impossible and

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[1] *Regulations for Automatic Vehicle Monitoring Systems*, 8 F.C.C. Rcd 2502, 2506 (1993) ("*NPRM*").

sought to rationalize why. Despite their self-interested efforts, it is clear that sharing is possible, is immediately feasible, and in the public interest. As amplified further herein and in the attached Technical Appendix, the field results from Pinpoint's experimental operations offer lucid and convincing evidence that sharing can be achieved in the manner suggested by Pinpoint.

Sharing will provide important benefits to the American public, as the *NPRM* recognized. North American Teletrac and Location Technologies, Inc., through their joint venture, PacTel Teletrac ("PacTel"), contend otherwise. Yet, in recent comments filed in PR Docket No. 93-144, where the Commission is proposing to confer only on *existing* 800 MHz Specialized Mobile Radio ("SMR") Service licensees the initial opportunity for an Expanded Mobile Service Provider license, PacTel expressed strong support for open-entry and competition. Specifically, PacTel Paging forcefully declared a concern:

> . . . that an 800 MHz SMR licensing scheme that provides a *de jure* licensing preference to incumbent license holders may not serve the public interest. The public interest is better served by adopting policies which permit open entry and full competition.[2]

PacTel Paging continued by asserting that bestowing an exclusive privilege on a company solely because of when it became a licensee would constitute questionable policy and could stifle technological development:

> The preference proposed here, however, is based solely upon the applicant being a licensee before a particular date. Indeed, this might

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[2] Comments of PacTel Paging, PR Docket No. 93-144 at 5 (filed July 19, 1993) ("PacTel Paging Comments").

> reward licensees who have not been at the forefront of development by allowing them to expand their systems without competition.[3]

These positions advanced by PacTel clearly apply to the band plans and licensing schemes being considered in this proceeding. Not only has PacTel Paging articulated sound policy, its comments in Docket 93-144 underscore the disingenuous motives underlying the hills of paper submitted by PacTel in this proceeding in support of retroactive exclusivity.

The *NPRM*'s alternative proposal to grant temporary exclusivity to existing wide-area licensees in 16 MHz of the band would grievously disserve the public interest. It would amount to permanent exclusivity, as the incumbents -- PacTel and MobileVision, L.P. ("MobileVision") -- would have no incentive to share in the future, as they have made abundantly clear. Indeed, the unprecedented manner of granting exclusivity that PacTel and MobileVision urge the Commission to adopt would violate the seminal teachings of *Ashbacker v. FCC*[4] and run fundamentally contrary to the principles of fairness and the promotion of radio for the benefit of the public which underlie the Supreme Court's timeless admonitions in that case.

Further, the comments of PacTel repeatedly reinforce Pinpoint's demonstrations that maximization of the permissible bandwidth of pulse-ranging hyperbolic multilateration systems will support exponentially greater capacity and that co-existence

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[3] *Id.* at 5 n.11.

[4] 326 U.S. 327 (1945).

with local-area systems is technically plausible. In short, the record, stripped of its rhetorical flourishes, supports Pinpoint's band plan counter-proposals: opening the entire 902-928 MHz band to all AVM operations, both wide-area and local-area systems, on a shared basis.[5]

Consistent with this conclusion, the Commission need not alter the status of this band for amateurs and Part 15 unlicensed devices. Wide-area systems can -- and should -- be designed to tolerate a reasonable amount of interference from Part 15 secondary uses, just as they must be able to co-exist with co-primary local-area AVM systems. Similarly, a blanket prohibition on amateur operations would be overly restrictive. The amateur community has a good record of compliance with Commission policies. If secondary and tertiary allocations are to work, licensees accorded a higher priority in the band should first work to implement operations that maintain a reasonable level of access to the band for lower priority users even though the latter are subject to the condition that interference be accepted by and not caused by them.

Finally, the Commission must not open the band to wind profilers absent more study of the same. While the sole commercial proponent of such systems, Radian Corporation, has supplemented its earlier filings in RM-8092 and Docket 93-59 with a modicum of additional information on its proposed systems, the prospects for serious interference-related mischief in this band from such operations remain real.

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[5] Pinpoint's full-sharing band plan proposals are attached hereto as Appendix A. As explained in Pinpoint's comments, the second plan incorporates quiet zones for wide-area systems using 4 MHz or less spectrum, such as PacTel, in which local-area AVM systems are subject to more restrictive power limits.

I. SHARING AMONG WIDE-AREA AVM SYSTEMS IS TECHNICALLY FEASIBLE WITHOUT UNDUE ECONOMIC CONSEQUENCES

In response to a central issue posed by the Commission in this proceeding, sharing among wide-area AVM systems is immediately feasible, both technologically and economically. But because sharing means competition, the other wide-area AVM proponents filing comments that are also existing licensees do their best to evade or distort the issue posed by the agency. These parties, in order to preserve their speculative edge, argue for two exclusive 8 MHz allocations in each market.

Southwestern Bell Mobile Systems ("SBMS"), which, like Pinpoint, has pending applications for wide-area system licenses, would expand the market to four entrants by dividing the proposed two 8 MHz wide-area sub-allocations into 4 MHz blocks. This would entail a serious compromise of the public benefits this band has to offer: with access only to a 4 MHz bandwidth, wide-area AVM systems would have such low capacity -- SBMS indicates that it will only be able to achieve 20 position fixes per second -- that they would be, for all practical purposes, incapable of any true IVHS applications.[6] However, while SBMS threatens to trivialize AVM, its underlying inclinations are sound: competition among wide-area systems should be encouraged.

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[6] *See*, Technical Appendix, Response to Comments Filed in PR Docket No. 93-61, attached hereto as Appendix B and made a part hereof ("Technical Appendix"). The Technical Appendix was prepared by Louis H.M. Jandrell, Pinpoint's Vice President of Design and Development. Indeed, the sure sign that SBMS has something very different from IVHS and other high-capacity AVM functionalities in mind is its suggestion that LMS include monitoring the status of fixed units, such as the inventory of vending machines. Comments of Southwestern Bell Mobile Systems, PR Docket No. 93-61 at 5-6 (filed June 29, 1993) ("SBMS Comments").

The best way to accomplish this, indeed the only way, Pinpoint submits, is through time-division multiple access. As Pinpoint explained in its opening comments, such sharing can be accomplished practically and economically.[7] Of course, such demonstrations are anathema to PacTel Teletrac and MobileVision, which seek to convert their shared spectrum licenses into something far more valuable: exclusive, essentially nationwide, authorizations in 8 MHz of prime land mobile spectrum.[8] Accordingly, both of these parties erect numerous "straw man" arguments in an effort to convince the Commission to adopt the *NPRM*'s alternative proposal: "temporary" exclusivity. As Pinpoint discussed in its opening comments, temporary exclusivity is indistinguishable from permanent exclusivity in the current circumstances because at least the top 50 markets would automatically go to PacTel and MobileVision under this proposal.[9] Moreover, there is not a single thread of evidence in the comments of either party that they would willingly share, irrespective of feasibility.

PacTel is perhaps the more egregious in this regard, despite the purported focus on sharing issues in its thick pleading. Yet, for the most part, PacTel dwells on dispelling the prospects of co-channel, *simultaneous* operation by two wide-area

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[7] Comments of Pinpoint Communications, Inc., PR Docket No. 93-61, at 16-21 (filed on June 29, 1993) ("Pinpoint Comments").

[8] Indeed, like PacTel and MobileVision, SBMS seeks exclusive licensing albeit on a slightly more modest scale. In its comments, it completely ignores the issue of time-sharing, assuming the need for exclusivity. Location Services, a licensee in a handful of markets also licensed to MobileVision, seems primarily intent on converting its licenses into exclusive holdings as well, but it neither engages the sharing issue -- ostensibly assuming exclusivity -- nor gives any indication of the types of services it would provide should it ever build out one or more of its licensed systems.

[9] *Id.* at 12-14.

systems in the same geographic market. While PacTel's arguments in this regard unwittingly lend strong support for the feasibility of sharing by wide-area and local-area systems, as discussed,[10] they are beside the point when it comes to the co-existence of wide-area systems. PacTel triumphantly points out Pinpoint's "concession" that sharing among wide-area systems cannot be accomplished under such simultaneous operation basis. However, Pinpoint has never contested that sharing among co-channel wide-band systems could be accomplished if operation were permitted to be simultaneous. Pinpoint's discussion of sharing, in contrast, focuses on where the real issue concerning sharing lies -- sharing through time division multiple access ("TDMA") to the band -- rather than ridiculing the Commission's proposal for sharing among wide-area systems.[11]

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[10] *See infra* Section IV.

[11] PacTel disingenuously contends that Pinpoint has conceded most of the technical points made by an engineer it had hired to review Pinpoint's applications for initial systems licenses in twenty cities. Comments of North American Teletrac and Location Technologies, Inc. (PacTel), PR Docket No. 93-61 at 28 n.31 (filed June 29, 1993) ("PacTel Comments"). In a trivial sense, Louis Jandrell, Vice President of Design and Development at Pinpoint, could be said to have agreed with many of the points made by Charles Jackson in an affidavit attached to Pinpoint's opposition to PacTel's application for a freeze on licensing, before Mr. Jandrell proceeded to explain the feasibility of sharing, which rests on entirely different premises than those addressed by PacTel's consultant. However, because those conceded preliminary points were irrelevant to the central technical issues raised by time-division sharing, Pinpoint fails to see the importance of the fact that Mr. Jandrell bypassed these superfluous issues to get to the heart of the matter: the Jandrell statement disagreed with Dr. Jackson on the fundamental issue of whether sharing among wide-area systems is now feasible through time-division multiple access.

PacTel defers entirely to the discussion presented in a study prepared by Dr. Raymond Pickholtz attached to its comments that purports to examine TDMA.[12] As Pinpoint explains below, Dr. Pickholtz fails to demonstrate the infeasibility of sharing.

Professor Pickholtz concludes off the bat that "[t]ime sharing . . . is an obvious approach,"[13] but then proceeds to mischaracterize the situation, suggesting that time slices need be approximately one second in duration.[14] As even Dr. Pickholtz's seemingly absurd example shows -- he assumes the possibility of a receive site *50 miles* from the mobile being involved in the position fixing -- flight times will be almost four orders of magnitude shorter than a second, about a quarter of a millisecond.[15] The fact of the matter is that a typical separation between a base station and a mobile in a cluster should be an order of magnitude less, such that the flight times are more on the order of only a few tens of microseconds.

As noted earlier, Pinpoint has conducted field tests of its wide-area AVM system. Pinpoint's field results demonstrate that the pulse transmissions involved are on the order of 0.0002 seconds in duration. A position fix takes almost exactly one millisecond, from the time the base station "powers up" and polls the mobile until the receive sites in a cluster receive the mobile's pulsed transmissions and measure the

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[12] PacTel Comments at app. 1 (R. Pickholtz, Engineering Analysis of Co-channel Pulse-Ranging LMS Systems) ("Pickholtz").

[13] *Id.* at 27.

[14] *Id.* at 27 n.28.

[15] *Id.*

times of arrival. Accordingly, one thousand position fixes may be performed in one second in a single cluster of four or more receive sites.[16] Thus, while Pinpoint agrees that "[s]econds are approximately the right duration of time slices," they could easily be a tenth of a second or less, depending on the desires of the sharing parties and the state of the technology employed.[17]

This extremely short time to complete a position fix underscores the ability of synchronized mobiles to make "asynchronous" requests, a feature over which PacTel and MobileVision have expressed a certain anxiety. Certain sub-slices of a licensee's time slice could be set aside for "high priority" "asynchronous" mobile requests, such as those involving a police emergency.[18] The mobile would await the associated system's next available time slot and use the next "asynchronous" time slice to make its request, after which a position fix would occur within a few milliseconds. Under a typical time sharing regime with eight or ten sharers, the time elapsing between the request and the response need not be more than four or five seconds, and may easily be two or three seconds. Thus, to the person making the request, the request would

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[16] *See* Technical Appendix.

[17] For example, one party in a sharing arrangement of five, might desire to have its "second" split into four even segments so as to allow it to provide "updates" in an emergency situation approximately every second or every other second (as well as to receive position fixes from several hundred other vehicles). Thus, Firm A could use the first quarter second, Firm B the next second, Firm A the next quarter second, Firm C the next second, Firm A the next quarter second, and so on. If each system wanted to avoid waiting on the order of several seconds before having access to the spectrum, the parties could all share on a round-robin basis for one-quarter-second increments every N/4 seconds, with N being the number of systems sharing the spectrum in that market.

[18] Emergencies involving stolen cars generally would not be asynchronous, as MobileVision suggests, because a base station would have to activate the stolen car's transmitter.

appear asynchronous, while the system would wait until its next "asynchronous" time slot opened. The result would be identical to the sort of asynchronous operations described by PacTel and MobileVision.[19]

Professor Pickholtz identifies four issues that he maintains must be addressed before time-division could be adopted: rules, technical concerns, incentive issues, and the Commission's enforcement burden. Pinpoint will discuss each of these in turn.

1. Rules

As Pinpoint explained in its comments, sharing should be implemented by having all qualified applicants (tentative selectees) in a market that file within the appropriate filing window coordinate among themselves through a combination, as appropriate, of frequency division and time-sharing.[20] In the absence of a successful negotiation among the tentative selectees, each selectee would have access to the spectrum once it built its system for one-half second, every N/2 seconds, N being the number of tentative selectees constructing and operating systems.[21]

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[19] *See* Technical Appendix.

[20] Pinpoint Comments at 35-38. Pinpoint notes that the Commission recently adopted an approach to implementing PCS that involves negotiation among spectrum users in order to bring new entrants and services to the 2 GHz portion of the spectrum. *See, e.g.*, Procedures Adopted For Emerging Technology Access To 2 GHz Spectrum, FCC Report No. DC-2463 (July 15, 1993) (FCC News Release).

[21] Pinpoint Comments at 37.

Professor Pickholtz observes, as Pinpoint has, that carrier-sense multiple access will not work in a high-capacity AVM environment.[22] He then identifies as workable, from the standpoint of rules, the methods previously discussed by Pinpoint: simple time-slicing on a round-robin basis or, at a more sophisticated level, "coordinat[ion of] the spectrum access by the individual systems" through a central control site.[23] This last method is what Pinpoint has characterized as the use of an "arbitrator".[24]

Finally, Professor Pickholtz recognizes that the administrative burden due to the implementation of sharing would be far less for the Commission if the tentative selectees worked out the details of sharing pursuant to a rule such as the current Section 90.173(b), under which sharing has operated successfully for years.[25] Professor Pickholtz is concerned that this may lead to "uncertainty" down the road,[26] but Pinpoint submits that, if sharing plans are subject to FCC approval and enforcement, concerns of "uncertainty" are not well-founded.

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[22] Pickholtz at 28.

[23] *Id.* at 29. Pinpoint agrees that the "token-passing scheme" alluded to by Professor Pickholtz is less desirable than the others. Technical Appendix.

[24] Pinpoint Comments at 18-19.

[25] 47 C.F.R. § 90.173(b) (1992).

[26] Pickholtz at 29.

2. Technical Issues

Having recognized the administrative and conceptual feasibility of sharing, Dr. Pickholtz suggests the need to address four technological issues, overhead transmissions associated with synchronization, rapid response requirements, support of asynchronous transmissions, and the use of very long-duration, low-power pulses.

Professor Pickholtz contends that the use of overhead transmissions for the synchronization and calibration of systems will be wastefully duplicated in a sharing environment.[27] Ignoring the capacity gains conferred on all systems if the wider bandwidths made possible in a full sharing situation are used -- which would reduce the relative proportion of spectrum dedicated to synchronization overhead -- Pinpoint's field results confirm overhead is likely to constitute less than 1% of airtime for a well-engineered system.[28] Given the exponential increase in capacity made possible by wider bandwidth,[29] overhead will constitute an even smaller fraction of a percentage with greater spreading, as is possible under the Pinpoint full-sharing band plan proposals. Accordingly, the amount of "spectrum" dedicated to overhead need be minimal and not a drain on overall spectrum efficiency in a sharing environment.[30]

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[27] *Id.* at 30.

[28] Technical Appendix.

[29] *See* Pinpoint Comments, exh. A, *The Relationship Between Position-fixing Rate and Occupied Bandwidth in AVL Systems*.

[30] Technical Appendix. Professor Pickholtz also contends that, if a system has a maximum time it can go without transmissions, "as additional firms are authorized in the band, time-division sharing will

(continued...)

Professor Pickholtz is also concerned that rapid response requirements be accommodated under a sharing regime. Again, a system operator's accommodation of such requirements is a matter to be resolved during negotiations by a group of tentative selectees, all of whom would presumably share the same concern, and prioritization within a firm's own time slots. Accordingly, an AVM firm could schedule its time slots and internally coordinate the use of the same to accommodate emergency request from motorists or police, for example, and acknowledgments thereof in a satisfactorily short time.[31] In short, whether there is "an efficient tradeoff between applications requiring different performance characteristics" is a decision to be made by each tentative selectee. Failure to do so cannot be laid at the feet of time-sharing.

Finally, Professor Pickholtz complains that time-division approaches might limit the use of very long-duration, low-power pulses that might be used with small, covert transponders for law enforcement purposes. First, relatively high powered short pulse transceivers can be made small and powered from a vehicle. Second, even if there were difficulties in doing so, it would hardly make sense to sacrifice the more pressing and publicly beneficial uses of the band for high capacity IVHS applications for an inefficient low powered long pulse technology that is better suited for low noise virgin

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[30](...continued)
force the system across this limit." Pickholtz at 30. This objection apparently postulates the ability of new systems to come into the market indefinitely in the future. Under Pinpoint's proposal, after the closure of an open filing window, no additional systems would be permitted. Accordingly, sharing negotiations should lead to a situation preventing any system from being forced across its maximum time limit without transmissions.

[31] Pinpoint finds it incredulous that motorists requesting roadside aid would begin to panic if assistance is not provided in less than ten seconds, as Dr. Pickholtz implies. *See id.*

spectrum. In other words, the long-pulse, low-power "tail" should not wag the high-capacity AVM "dog."[32]

3. Incentive Issues

Professor Pickholtz asserts that TDMA may create incentives to "cheat," and postulates the creation of "'new' entrants" by existing licensees sharing an allocation. The purpose of these new entrants would be to obtain more time slices for the existing licensee through the guise of "renting capacity" from that licensee.[33] He concludes that initial licensees "have an enormous incentive to create such additional firms to get an additional spectrum share and to deny capacity to their competitor."[34]

Under Pinpoint's proposal, the situation postulated by Professor Pickholtz could not occur. All members in a sharing group would have to have their own applications demonstrating the intention and financial qualification to construct a separate system. No new licensees would be permitted after the filing window closes. Furthermore, while Pinpoint postulates that each system should be a stand-alone system, a limited amount of base station structures could be shared (but not transmitters and receivers) to

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[32] Similarly, a personal locator service seems incompatible with high-capacity IVHS applications and should not be permitted to be an obstacle to the same, particularly as there are other possible homes for personal location. *See* Technical Appendix.

[33] Pickholtz at 31. For example, if the band is shared by Firms A and B on an equal time basis, Firm A could create A-prime which would "rent" Firm A's system. Postulating that Firms A, A-prime, and B would share equally, each receiving one-third, Firm A would effectively have two-thirds of the time slices.

[34] *Id.*

take advantage of some efficiencies without reinjecting undesirable incentives into the sharing scenario.[35] Thus, those applicants who might be tempted to form settlement groups so as to pool their time and avoid installing their own separate transmitters and receivers could do so. However, the total time to the group would be limited to that which would have been available to one such applicant.

Nor will the incentives to innovate be stifled under time-sharing, certainly not to the extent they would be under an exclusive licensing regime. Indeed, PacTel itself is plainly aware that the absence of competition fails to create incentives to innovate, as one of its mobile affiliates explained to the Commission last week.[36] Moreover, the disincentives cited by Professor Pickholtz are not germane. The fact that some purported innovations may not operate in a time-division environment -- PacTel cites the example of low-power long-pulse battery-operated mobile units[37] -- does not mean that innovative ways cannot be developed in a TDMA regime to meet the same needs.[38]

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[35] While Pinpoint does not believe a token-sharing protocol yields the best sharing arrangement, Technical Appendix, Professor Pickholtz's discussion of incentives does not present an issue of great concern because if one firm keeps the token for all the time-consistent with its share, no one has been "cheated."

[36] As noted, *supra*, PacTel Paging has recently stated that giving existing licensees special status solely because a licensee received authorization before a particular date "might reward licensees who have not been at the forefront of development by allowing them to expand their systems without competition." PacTel Paging Comments, *supra* note 2, at 5 n.11.

[37] Pickholtz at 32. *See* discussion *supra* Section I.2.

[38] Indeed, the main problem is accommodating the low power long pulse transceivers is not necessarily TDMA; it is PacTel's insistence on the use of low power that may have more difficulty overcoming noise in a congested ISM band shared with Part 15 and others. If the PacTel system

(continued...)

Professor Pickholtz also suggests that there will be no incentive to increase capacity because the "lion's share" of the increase would be divided among a firm's competitors. While this might be true in a token-sharing scheme, it is absolutely false in the much more preferable time division approach where each system has the right to the spectrum for a specific and equal amount of time.[39] In the latter case, there is every incentive to improve efficiency and increase capacity. There may also be an incentive for a firm with excess capacity to sell or barter its spare capacity to others.

Dr. Pickholtz also suggests that incentives to remedy faults would be decreased.[40] This is utterly misplaced. In the first place, the failure to remedy known faults could lead to forfeitures and the revocation of licenses. In the second place, tort liability could follow from failing to locate (which should be easy to do) and shut down the faulty unit. In the third place, it is true in a simple-minded sense that to use a faulty, continuously-emitting transmitter will harm the "owner" who is one of three competitors for only one-third of the time than if the "owner" were the only operator, as PacTel's consultant suggests. However, the faulty unit would still

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[38](...continued)
operates with enough power to get over the noise threshold, it could average over multiple time slots or devote most of a slot to such a long-pulse low powered application. The other problem with low powered long pulses is that they eat up tremendous amounts of spectrum resources -- obtaining a single fix could eat up the capacity equivalent to that needed for hundreds or even thousands of high power fixes.

[39] Even if in a sharing arrangement, one firm negotiated a right to more than its proportionate share of time, an increase in efficiency would not effect that right, and the firm would fully enjoy the fruits of its increase in capacity.

[40] Pickholtz at 33.